DOCUMENT RESUME

ED 252 861 CS 208 730

TITLE Using the Computer to Teach Language Arts (Spelling).
INSTITUTION Alberta Dept. of Education, Edmonton. Planning Services Branch.; Edmonton Public Schools, Alberta.e
PUB DATE Sep 83
NOTE 24p.
PUB TYPE Reports - Research/...hnical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Computer Assisted Instruction; Computer Software; *Educational Research; Grade 3; *Individualized Instruction; *Language Arts; *Microcomputers; Primary Education; Program Development; Program Evaluation; *Spelling Instruction; Student Improvement; Student Needs; Teaching Methods

ABSTRACT

A study was conducted to determine if computers are viable alternatives to textbooks for teaching spelling and related skills at the third grade level and to compare the change in attitude toward spelling of students in a computer assisted program with that of students in a textbook learning program. The 18 experimental and 18 control group students were pretested using a standardized spelling achievement test, a sentence dictation test, and a school attitude scale. Students in the experimental group used microcomputers four days a week for approximately 20 minutes. Their spelling words were presented by Compu-spell courseware in a sentence format, practiced, and then tested on the computer. Other computer programs were used to teach related skills such as syllabication and alphabetization. Students were also given writing opportunities to use the spelling words. The control group students received only traditional classroom instruction using authorized text materials. At the end of six months, posttesting was conducted with the same test instruments. Results indicated that experimental group students scored significantly higher than control group students on all three measures. In addition, students in the experimental group completed more spelling units. (Copies of the tests used in the study are appended.) (FL)

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Using the Computer to Teach Language Arts (Spelling)

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S208 730

USING THE COMPUTER
TO TEACH LANGUAGE ARTS (SPELLING)

Lansdowne Elementary School

Edmonton Public Schools

Under Contract to Alberta Education

Edmonton, Alberta

September, 1983

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USING THE COMPUTER TO TEACH LANGUAGE ARTS (SPELLING)

Abstract of the Project

The purpose of the project was to implement computer assisted instruction in Grade 3 Language Arts with an emphasis on spelling and related skills. Pupils in the experimental group (computer-assisted instruction group) scored significantly higher than a control group on spelling achievement, sentence dictation, and attitude toward spelling. The students spent approximately 20 minutes each day on the computer.

Project Director: Gloria Cathcart

Project Location: Lansdowne Elementary School, Edmonton Public Schools

Date Project Commenced: September 1, 1982

Purpose of the Project

The purpose of the project was:

1. To determine the effectiveness of the use of the microcomputer in language arts, particularly in spelling and spelling related activities.
2. To evaluate Compu-spell spelling courseware.
3. To provide challenge and interest by allowing pupils to move at a pace suited to their needs and abilities.

Objectives of the Project

The main objectives of this project were:

1. To determine if the computer is a viable alternative to the textbook for the teaching of spelling and related language arts skills at the grade three level.
2. To compare the effectiveness of a computer learning program to a textbook learning program in terms of final spelling scores.
3. To compare the change in attitude towards spelling in a computer assisted instruction environment with a textbook learning program.

4. To determine how much computer time is required each day for students to make significant gains.

Hypothesis to be tested were as follows:

1. The experimental group will perform significantly better in spelling achievement than a control group.
2. The total number of errors in sentence dictation activities will significantly decrease for the experimental group.
3. The attitude of the experimental group towards spelling will improve significantly during the year.
4. The experimental group will show greater gains than the control group with respect to spelling achievement scores, sentence dictation proficiency, scores on the Edmonton Public School Board Elementary Reading test, and attitude toward spelling.

Design of the Project

A. Methods and Procedures

Microcomputers were used daily by grade three pupils. Each child had approximately 20-30 minutes of hands on time per day for four days each week. Spelling vocabulary, selected by the teacher, was presented via Compu-spell courseware. Vocabulary was presented in a sentence format, practiced and tested on the computer. Ninety percent accuracy was required to pass to a new lesson. From November through April, pupils completed an average of 65 lessons of ten words each. Additional computer programs such as syllabication, alphabetization, combining sentences and homonyms were used to integrate spelling with the ongoing language arts program. Opportunity to use vocabulary in creative writing and report writing was provided. The control group did not use a computer for any of its language arts work but received traditional classroom instruction using authorized textual materials.

B. Personnel Involved in Project

The total grade three population of Lansdowne School was invovled. The class was taught by Mrs. Gloria Cathcart. Although this class maintained an average attendance of 20 pupils, the results are based on 18 due to transfers. Both grade two and three reading scores (decoding and comprehension) from the Edmonton Public School Board Reading Test (administered in May, 1982 and May, 1983) were available for only 15 Lansdowne pupils.

Eighteen pupils in a grade three class in a neighboring school served as a control group. Reading scores were available for 17 of these pupils.

C. Evaluation Procedures Used

The project director administered the evaluation tests. The project was evaluated through the use of the following instruments:

EPS Spelling Achievement Test, Form A (October, 1982)
EPS Spelling Achievement Test, Form D (May, 1983)
Sentence Dictation Test, Teacher Developed (October 1982, May 1983)
School Subjects Attitude Scales, Nyberg and Clark (October 1982, May 1983)

The target population included all Grade 3 students at Lansdowne School. The control group consisted of one class of Grade 3 students selected from a neighboring school. Pretests were administered to the experimental and control groups at the end of October and in the first week of November, 1982 and the posttests were administered during the first and second weeks of May, 1983.

Results of the Project

1. On all three tests (Spelling Achievement, Sentence Dictation, and School Attitudes), changes in scores from pre to post tests for the experimental group were statistically significant at the 0.001 level. (See Table 1).

2. On all three tests, changes in scores from pre to post tests for the control group were statistically significant at the 0.05 level.
3. On the pretests, there were no statistically significant differences between the experimental and control groups on any of the tests used in the study.
4. On the grade three Edmonton Public School Board Reading Test administered in May, 1983, the experimental group had a mean of 56.47 on the decoding section and a mean of 65.07 on the comprehension section. The corresponding means for the control group were 56.59 and 63.88. The results involved no significant differences.

Table 1

Gains in Achievement in Spelling and Sentence Dictation and Improvement in Attitude for Each of the Experimental and Control Groups

Criteria Measure		Experimental Group (n=18) Pre-Test	Post-Test	Differences	(Control Group (n=18) Pre-test	Post-test	Differences
Spelling Achievement	__	28.06	38.56	10.50***	28.22	30.67	2.45*
	SD	7.62	5.35		8.33	8.74	
Sentence Dictation	__	77.22	90.00	19.78***	78.22	83.67	5.45***
	SD	10.43	5.81		12.70	12.19	
School Subjects Attitude	__	70.50	82.39	11.89***	67.41	53.94	-13.47*
	SD	13.50	17.97		12.21	24.68	

* $p < .05$
*** $p < .001$

T-test for correlated means were used in determining statistical significance of differences.

5. On all three post tests (Spelling Achievement, Sentence Dictation, and School Attitudes), the experimental group scored statistically significantly higher than the control group. (See Table 2).
6. On the School Subjects Attitudes Scales, the experimental group improved significantly while the control group scored lower (more negative) by a significant degree. This may be the result of the novelty of using the microcomputer in the spelling program with the experimental group and not in the control group. (See Table 2).
7. Pupils in the experimental group completed an average of 65 spelling units (the range was 50 to 89) with 90% accuracy during the term. All pupils in the control group completed 30 units. Pupils went on to the next unit regardless of post test scores.
8. It can be concluded that using the microcomputer for twenty minutes per day for four days each week resulted in significant gains for students in the experimental group.

As expected, both groups improved in spelling achievement during the pretest and posttest interval. Differences between pretest and posttest scores were significant for the Spelling Achievement and the Sentence Dictation tests. Also, as expected, for the control group, attitude toward spelling as a subject declined over the period. However, for the experimental group, attitude toward spelling improved.

TABLE 2

Differences Between Experimental and Control Classes on Posttest Achievement

Achievement Measure		Posttest Score Results: Experimental Group	Control Group	Difference
Spelling Achievement	N	18	18	
	$\bar{X}$	38.56	30.67	7.89**
	SD	5.35	8.74	
Sentence Dictation	N	18	18	
	$\bar{X}$	90.00	83.67	6.33*
	SD	5.81	12.19	
School Subjects Attitude	N	18	18	
	$\bar{X}$	82.39	53.94	28.45***
	SD	12.21	24.68	

* $p < .05$
** $p < .01$
*** $p < .001$

One-tailed t-test were used to establish levels of statistical significance of difference.

Table 2 provides information on differences between the experimental and control groups on posttest score results in Spelling Achievement, Sentence Dictation and Attitudes Toward School Subjects. Since differences between experimental and control groups on pretest scores were not statistically significant, the groups were considered equivalent when the program commenced. Hence, differences at the end of the program (based on posttest results) can be attributed to the experimental procedures.

The experimental group scored statistically significantly higher on the three posttests than the control group. The experimental program had a measurable impact on

student learning in spelling and on the spelling and writing skills measured in the sentence dictation test. In addition, improvements in attitude toward spelling probably resulted from the CAI program.

Observations and Conclusions

1. Several of the grade three pupils became proficient at booting the computers, setting up the program with the appropriate disks in the disk drives of each of the three microcomputers and handling the pupil rotation, even in the absence of the teacher. They also accepted responsibility for putting everything away and powering down at the end of the day.
2. All pupils became proficient in operating the computer, handling the program, and typing in appropriate responses.
3. The interaction between pupils was very positive; one of helpfulness and sharing. Some pupils used the typed word lists to locate vocabulary for a classmate at the keyboard.
4. Both the teacher and the pupils accepted the rotation routines readily.
5. The pupils willingly took responsibility for work covered in class while they were at the microcomputer. Assignments were recorded on the board and more able pupils or the teacher would assist other pupils. Having the computers at the back of the room made it possible for pupils to "listen in on the teaching lesson while working at the microcomputer".
6. No misuse of either hardware or software occurred.
7. Pupils demonstrated a very positive, mature attitude. They were proud of their ability to handle the computer as well as their success with the spelling program. There were no signs of tension, but rather a happy, relaxed atmosphere. Pupils were never forced to go to the computer, but were always anxious and willing for extra turns as well as their regular turn.
8. The comments of pupils throughout the year and at the end were positive. Several indicated that they enjoyed the challenge lessons and were glad to be able to use new words in their stories and know they had them spelled correctly.
9. The growth in writing skills noted by the teacher was very gratifying.

10. Two data disks (approximately 50 lessons each) containing grade three spelling vocabulary, were prepared for use in this project. Although this task was time consuming, it was not difficult.
11. Both teacher and students were pleased with the progression rate through the units. Although the three students who completed the most units were aware that they were leaders, most pupils were unaware of their position in class, but rather, were pleased with their continued success and progress. At no time throughout the term did pupils lose interest or skip their turn. This is evident in that even the slowest pupil completed 50 units with 90% accuracy. Pupils could not move on to a new unit until they had at least 90% in the posttest.

Number of Units Completed	Number of Students
50-54	3
55-59	6
60-64	3
65-69	2
70-74	-
75-79	-
80-84	1
85-89	3

12. The brief computer literacy program offered in September and October provided pupils with an introduction to computers, what they are and how they work. Time was spent on developing keyboard familiarity and interacting with a computer.

Significance of the Project

Using the computer and the Compu-spell program was found to be an effective method of presenting, practicing and posttesting spelling vocabulary. Since the program provided the teacher with the option of building data files, the integration of spelling with the ongoing language arts program and other subject areas was enhanced. The

use of other supplementary courseware allowed for additional integration. The Minnesota Educational Computing Consortium diskette entitled Elementary Vol. 5 - Prefixes was used by the experimental group. Milliken Language Arts - Study Skills: Alphabetization was found to be useful software for the grade three language arts. Use was made of the appropriate levels. Milliken Language Arts - Grammar Problems: Homonyms was also very useful and appealing to the students. Although other parts of the Grammar Problems appear to be useful at grade three, they were not tried due to insufficient computer-time. The teacher was also provided with options for individualizing the spelling program within the framework of the Compu-Spell program.

Difficulties Encountered in Conducting the Project

The main difficulty encountered was the occasional malfunction of the Compu-spell System Master. The latest version is much better but it still requires great care in following the correct procedures, especially when obtaining a print out of pupil results. It was found necessary to have a hard copy (printed lists) of the spelling vocabulary data for times when the pupil forgot the spelling word and the sentence context clues were not sufficient.

Recommendations

1. The use of computer assisted instruction to teach spelling and sentence dictation was effective. It is recommended that elementary school teachers use the microcomputer to instruct students in Language Arts at the grade three level and above.

2. It is recommended that elementary school teachers use the microcomputer to improve pupil attitude toward spelling. Using the computer in the classroom provided interest and stimulation.
3. The use of the microcomputer in the classroom is recommended to improve spelling achievement scores.
4. Compu-Spell is recommended as suitable software for use with pupils at the grade three level and above.
5. It is recommended that Compu-spell be used with dual disk drives and not with a single drive.
6. Fifteeen to twenty minutes per day at the microcomputer is recommended as a suitable amount of time. If pupils are unfamiliar with computers and Compu-spell, a thirty minute period every second day would prove more effective until pupils can handle the system more efficiently.

APPENDICES

INSTRUMENTS USED IN TESTING

Edmonton Public School Board Spelling Achievement Test--Form A

Edmonton Public School Board Spelling Achievement Test--Form D

Sentence Dictation Test (Teacher made)

School Subjects Attitude Scales (Nyberg and Clark)

VI. TESTS

A. Spelling Achievement Test

1. Spelling Achievement Test, Form A

GRADE TWO START HERE
GRADE THREE START HERE

1.	play	Let us play outside.	play
2.	will	We will play a game.	will
3.	you	What would you like?	you
4.	he	Do you think he will come?	he
5.	ran	The girls ran fast.	ran
6.	snake	The snake hissed at us.	snake
7.	yellow	The door was painted yellow.	yellow
8.	very	You do very good work	very
9.	lots	We have lots of boxes.	lots
10.	wanted	She wanted to be here.	wanted

GRADE FOUR START HERE

11.	kind	What kind of tree is that?	kind
12.	pretty	She was a very pretty girl.	pretty
13.	doors	Lock both doors.	doors
14.	when	You may go when you finish.	when
15.	called	Mother called him for dinner.	called

GRADE FIVE START HERE
GRADE SIX START HERE

16.	blue	The sky is blue	blue
17.	swimming	They went swimming in the pool	swimming
18.	music	We are learning to play instruments during the music period.	music
19.	export	We export raw materials to other countries.	export
20.	digging	He is digging a hole.	digging
21.	uncle	I went to see my uncle.	uncle
22.	dairy	Milk comes from the dairy farm.	dairy
23.	shadow	The groundhog saw his shadow.	shadow
24.	their	Is their house painted white?	their
25.	interesting	It is very interesting to learn of Alberta's past.	interesting
26.	plastic	The cup is made of plastic.	plastic
27.	mountain	That is the highest mountain in the Rockies.	mountain
28.	else	What else would you like for Christmas?	else
29.	electric	They have an electric train in the basement.	electric
30.	traffic	The policeman controlled the traffic.	traffic
31.	rough	The road was very rough.	rough
32.	caught	He caught the grizzly bear in a trap.	caught
33.	division	We will learn long division this year.	division
34.	juicy	I enjoy eating juicy oranges.	juicy
35.	beginning	They are beginning their work.	beginning

****
* GRADE TWO STOP HERE *
****

36.	eighth	They had seats in the eighth row of the auditorium.	eighth
37.	pouring	The rain is pouring down today.	pouring
38.	figure	The girl was a figure skater.	figure
39.	caution	Did you caution the children about playing on the streets?	caution
40.	gymnastics	We take gymnastics in physical education class.	gymnastics
41.	helicopter	A helicopter is valuable in rescue work.	helicopter
42.	accident	Drive carefully or you may have an accident.	accident
43.	imagine	It is difficult to imagine ourselves being old.	imagine
44.	connection	The passengers hope to make a good connection with the next flight.	connection
45.	rhymes	Some poetry rhymes.	rhymes

****
* GRADE THREE STOP HERE *
****

46.	planning	What are you planning to do tonight?	planning
47.	questioned	The pupils questioned the teacher.	questioned
48.	studied	I studied for the test.	studied
49.	scene	He painted a mountain scene.	scene
50.	multiplication	Let's practise multiplication tables.	multiplication
51.	geometry	We study geometry in mathematics.	geometry
52.	mourning	The town is mourning its dead.	mourning
53.	scissors	Use the scissors to cut the paper.	scissors
54.	resistance	The police met with resistance when they made the arrest.	resistance
55.	parallel	The rails of a railroad track are parallel.	parallel

****
* GRADE FOUR STOP HERE *
****

4. Spelling Achievement Test, Form D

GRADE TWO START HERE
GRADE THREE START HERE

1.	that	I want <u>that</u> one.	that
2.	jump	A frog can <u>jump</u> quickly.	jump
3.	big	The giant looked very <u>big</u>.	big
4.	am	I <u>am</u> going to the circus.	am
5.	run	We can <u>run</u> fast.	run
6.	water	There is <u>water</u> in the jug.	water
7.	gone	Mother has <u>gone</u> to work.	gone
8.	warm	It is a <u>warm</u> day.	warm
9.	next	She will go <u>next</u> week.	next
10.	ate	She <u>ate</u> an apple.	ate

GRADE FOUR START HERE

11.	once	We saw the circus <u>once</u>.	once
12.	brothers	She has four <u>brothers</u>.	brothers
13.	children	The <u>children</u> played ball in the park.	children
14.	cent	She spent every <u>cent</u> of her allowance.	cent
15.	found	I <u>found</u> a penny.	found

GRADE FIVE START HERE
GRADE SIX START HERE

16.	birthday	Today is my birthday.	birthday
17.	Canada	There are ten provinces in Canada.	Canada
18.	who	I know who you are.	who
19.	third	You were third in the race.	third
20.	bought	She bought it at the store.	bought
21.	Alberta	In 1905, Alberta became a province.	Alberta
22.	closing	The store is closing now.	closing
23.	build	We will build a snow fort.	build
24.	lesson	She will have a piano lesson.	lesson
25.	kitchen	The smell of apple pies filled the kitchen.	kitchen
26.	livestock	Cattle, pigs, horses, and sheep are all livestock.	livestock
27.	wore	She wore her new shoes in the mud.	wore
28.	square	A square has four equal sides.	square
29.	clothes	Your clothes are very colorful.	clothes
30.	Christmas	At Christmas we exchange gifts.	Christmas
31.	million	A million dollars is a lot of money.	million
32.	beautiful	That was a beautiful Egyptian vase.	beautiful
33.	machine	Our washing machine is broken.	machine
34.	language	Can you speak more than one language?	language
35.	believe	I believe we have finally finished.	believe

****
* GRADE TWO STOP HERE *
****

36.	haunted	The house was not haunted.	haunted
37.	regular	This is a regular assignment.	regular
38.	princess	The princess entered the equestrian event in the Olympics.	princess
39.	dodge	We played dodge ball in the gym.	dodge
40.	mirror	The rear view mirror on our truck was broken.	mirror
41.	certain	He was not certain which route to follow.	certain
42.	you're	Do you know where you're going?	you're
43.	snowmobiling	Many Albertans enjoy snowmobiling in the winter.	snowmobiling
44.	scientist	The scientist was trying to discover a cure for colds.	scientist
45.	lawyer	The lawyer went to court.	lawyer

****
* GRADE THREE STOP HERE *
****

46.	decimal	Remember to put in the decimal point.	decimal
47.	engines	Three fire engines went past the school.	engines
48.	who's	I wonder who's knocking at the door?	who's
49.	scent	After the skunk left we could still smell the scent.	scent
50.	hundredths	The fraction is expressed in hundredths.	hundredths
51.	mysterious	A mysterious person answered the door.	mysterious
52.	community	The school serves our community.	community
53.	mischief	The puppy got into mischief.	mischief
54.	disease	The child is sick with a disease called measles.	disease
55.	orchestra	The music produced by the orchestra was pleasant to listen to.	orchestra

****
* GRADE FOUR STOP HERE *
****

SENTENCE DICTATION

1. His snack was a scrap of ham.
2. The gray cat has a black tail.
3. He caught his paw in the trap.
4. Did her car crash on the curve?
5. The worst scar wasn't from the wart.
6. Put the saddle in the stable.
7. Do not disturb the unhappy man.
8. He is unable to take action.
9. Luke can take a cruise on the launch.
10. Peter's fear of the gang made him retreat.
11. Jenny threw the horse's reins on the grass.
12. Joe groaned because his throat was sore.
13. The tough boy fought the monster.
14. The volcano will explode tomorrow.
15. The athlete is quite wealthy.

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SCHOOL SUBJECTS ATTITUDE SCALES

Developed by
V. R. Nyberg, Professor, University of Alberta
and
S. C. T. Clarke, Professor Emeritus, The University of Alberta

School _____ Grade _____ Class _____

male ___ female ___

_____
| |
Subject Rated

Please place only one mark between each pair of words. Be sure not to leave out any of the pairs.

	very much	a bit	neither	a bit	very much	
nice	---	---	---	---	---	awful
boring	---	---	---	---	---	interesting
unpleasant	---	---	---	---	---	pleasant
dislike	---	---	---	---	---	like
bright	---	---	---	---	---	dull
dead	---	---	---	---	---	alive
lively	---	---	---	---	---	listless (inactive, lazy)
exciting	---	---	---	---	---	tiresome (makes a person feel tired)
useless	---	---	---	---	---	useful
important	---	---	---	---	---	unimportant
impractical	---	---	---	---	---	practical (useful or workable)
worthless	---	---	---	---	---	valuable
helpful	---	---	---	---	---	unhelpful
unnecessary	---	---	---	---	---	necessary
harmful	---	---	---	---	---	advantageous (brings good or gain)
meaningful	---	---	---	---	---	meaningless (doesn't make sense)

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	very much	a bit	neither	a bit	very much	
hard	---	---	---	---	---	easy
light	---	---	---	---	---	heavy (a lot of work)
clear	---	---	---	---	---	confusing (mixes a person up)
complicated	---	---	---	---	---	simple
elementary	---	---	---	---	---	advanced (beyond the beginning level)
strange	---	---	---	---	---	familiar
understandable	---	---	---	---	---	puzzling (hard to understand)
undemanding	---	---	---	---	---	rigorous (has to be exactly right)